10CFR50.73

Virginia Electric and Power Company
Surry Power Station
5570 Hog Island Road
Surry, Virginia 23883

November 25, 2003

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555-0001

Serial No.: 03-198A
SPS: BAG/TJN R0'
Docket No.: 50-280
License No.: DPR-32

Dear Sirs:

Pursuant to 10CFR50.73, Virginia Electric and Power Company hereby submits the following Licensee Event Report Supplement applicable to Surry Power Station Unit 1.

Report No. 50-280/2003-002-01

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,

Richard H. Blount,
Site Vice President
Surry Power Station

Enclosure

Commitments contained in this letter:

1. The adjustment of the operating to overspeed trip setpoint margin for the Unit 1 Turbine Driven Auxiliary Feedwater Pump (TDAFWP) will be implemented during the next scheduled Unit 1 refueling outage.

2. Main Steam supply piping to the TDAFWP will be evaluated for moisture removal capability.

IE22

cc: United States Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23 T85
Atlanta, Georgia 30303-8931

Mr. G. J. McCoy
NRC Senior Resident Inspector
Surry Power Station

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
SURRY POWER STATION , Unit 1	05000 - 280	1 OF 5

TITLE (4)

Manual Steam Generator Level Control Results in Power Ascension Reactor Trip

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCUMENT NUMBER
01	25	2003	2003	-- 002	01	11	25	2003	FACILITY NAME	DOCUMENT NUMBER 05000-

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)											
POWER LEVEL (10)	27 %		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)				
[redacted]			20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)				
[redacted]			20.2203(a)(1)		50.36(c)(1)(i)(A)	X	50.73(a)(2)(iv)(A)		73.71(a)(4)				
[redacted]			20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)				
[redacted]			20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER				
[redacted]			20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A				
[redacted]			20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)						
[redacted]			20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)						
[redacted]			20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)						
			20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)						

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Richard H. Blount, Site Vice President	(757) 365-2000

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	[redacted]	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BA	65	W290	Y						

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES(If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 14 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On January 25, 2003, at 0700 hours a Unit 1 automatic reactor trip occurred during startup at 27% reactor power due to low-low level in "B" steam generator (SG). Automatic actuations occurred as expected, including Turbine Trip by Reactor Trip, and Main Generator Trip. The Turbine Driven Auxiliary Feedwater Pump (TDAFWP) started automatically, but tripped on overspeed. A root cause evaluation (RCE) determined that the difficulties with manual control of SG water levels at low power and the subsequent Unit 1 reactor trip were due to inadequate modification of the main feedwater regulating valves. An RCE for the overspeed trip of the TDAFWP was performed, however no single root cause was identified. The probable causes were inadequate margin between the overspeed trip setpoint and nominal speed, sluggish response of the governor at low temperatures, steam supply line water condensation, and inability of the governor valve to go fully closed. The TDAFWP governor was replaced and post maintenance testing completed on January 28, 2003. Training was provided to the operating shift responsible for the unit restart. Unit 1 was restarted and achieved 100% reactor power on January 31, 2003 at 0755 hours. This report is being submitted in accordance with 10CFR50.73(a)(2)(iv)(A).

1.0 DESCRIPTION OF THE EVENT

On January 25, 2003 at 0619 hours, Unit 1 was placed online following an eleven day forced outage due to high vibrations on a reactor coolant pump motor (reference LER 50-280/2003-001-00).

During power ascension with the main feedwater regulating valves (MFRVs) in manual mode of operation, the level on 'B' steam generator (SG) was observed to be decreasing. In response, the operating crew attempted to maintain level by isolating the 'B' SG Blowdown. At 0700 hours, an automatic reactor trip occurred at 27% reactor power due to a low-low level in 'B' SG. Automatic actuations occurred as expected, including Turbine Trip by Reactor Trip, and Main Generator Trip. Both Motor Driven Auxiliary Feedwater Pumps (MDAFWPs) automatically started due to the SG low-low level. At approximately 0701 hours, the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) started, however, the pump tripped on overspeed approximately 1½ minute later and was declared inoperable. The two MDAFWPs continued to run to provide the necessary heat sink. The combination of Steam Dump Valves remaining open, relatively low decay heat, inflow of cold AFW, and leakage past the Cylinder Heating Steam Valves, allowed the reactor coolant system (RCS) to cool down to an average temperature (Tave) of 543 degrees Fahrenheit (F) where the Steam Dump Valves automatically closed as designed. The RCS cool down continued to approximately 522 degrees F. In accordance with emergency operating procedures, the Main Steam Trip Valves were closed, AFW flow was throttled closed, and SG Power Operated Relief Valves were set to stabilize the RCS Tave to a no load value of 547 degrees F.

At 0925 hours on January 25, 2003, a four-hour and eight-hour non-emergency report was made to the NRC as required by 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72 (b)(3)(iv)(A), respectively. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A) for an automatic actuation of the reactor protection system (RPS) and the initiation of the AFW system.

2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

This event resulted in no significant safety consequences or implications. Although the TDAFWP tripped on overspeed after automatically starting, the two MDAFWPs automatically started and continued to provide the necessary heat sink. In addition, the cross-connect from the Unit 2 AFW system remained operable. All other emergency systems functioned as required for the reactor trip. Prior operability of the TDAFWP was demonstrated on January 14, 2003 when Unit 1 was manually tripped and the TDAFWP pump automatically started and provided auxiliary feedwater to SGs (reference LER 50-280/2003-001-00).

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

The shutdown margin for Unit 1 was determined to be satisfactory. All electrical busses transferred properly following the trip and all emergency diesel generators were operable. The RCS cooled to a minimum Tave of approximately 522 degrees F and then was stabilized to the no load Tave value of 547 degrees F. The operating crew acted promptly and appropriately to stabilize the unit at hot shutdown. Therefore, the health and safety of the public were not affected.

3.0 CAUSE

The Unit 1 reactor trip on January 25, 2003 was due to low level on the B steam generator. A root cause evaluation (RCE) determined that the difficulties with manual control of SG water levels at low power and the subsequent Unit 1 reactor trip were due to inadequate modification of the feedwater regulating valves.

A root cause was also performed for the overspeed trip of the TDAFWP. The RCE team determined that the most probable cause(s) of this equipment failure was a combination of:

- Design margins in the system place the overspeed trip setpoint too close to the operating speed of the turbine
- Sluggish governor [EIIS- BA, 65] response at low temperatures
- Steam supply line water condensation that challenged the governor control system
- Inability of the governor valve to go fully closed due to procedural tolerances that allow linkage setup that resulted in the governor servo being in the "full off" position prior to the governor valve being fully closed

4.0 IMMEDIATE CORRECTIVE ACTION(S)

The feedwater system engineer reviewed flow characteristics of the new style MFRV with the re-start operating crew. In addition, the training simulator was modified to replicate the response characteristics of the new style MFRVs and the operating crew responsible for the re-start of the unit received start-up simulator training. Lastly, a training synopsis was developed to assist operators on the use of feedwater flow and steam flow instrumentation at low power levels as an anticipatory means to control SG water level.

The TDAFWP governor was replaced and satisfactory post maintenance testing was completed. The TDAFWP pump was returned to operable status on January 28, 2003.

The unit was successfully restarted and achieved 100% reactor power on January 31, 2003 at 0755 hours.

5.0 ADDITIONAL CORRECTIVE ACTIONS

RCEs were completed to determine the cause for the difficulties with manual control of SG water levels at low power and the TDAFWP overspeed trip.

6.0 ACTIONS TO PREVENT RECURRENCE

In the Spring refueling outage of 2003, the Unit 1 MFRVs were modified to improve the response characteristics. Improvements were modeled on the simulator and licensed operators were trained on the changes using the simulator. These changes were effective and Unit 1 startup control has improved. Unit 1 has experienced three successful startups since January 31, 2003. Modifications to the Unit 2 MFRVs were completed during the Fall 2003 refueling outage.

Although the root cause could not be determined, the following corrective actions address the most probable causes of the Unit 1 TDAFWP overspeed trip:

- Unit 2 TDAFWP normal operating to trip margin was adjusted during the Fall refueling outage of 2003. Unit 1 TDAFWP margin will be adjusted during the next scheduled Unit 1 refueling outage.
- Operator logs were revised to monitor the Unit 1 and 2 TDAFW pump rooms to ensure the temperature remains at or above 50 degrees F.
- Unit 1 and Unit 2 TDAFW governor oil was changed to an oil having an improved viscosity over the expected governor operating temperatures.
- TDAFWP periodic test procedures were revised to add steps to drain two particular steam traps while the TDAFWP is running. These two steam traps normally do not have steam pressure on them unless the TDAFWP is running.
- Main Steam supply piping to the TDAFWP will be evaluated for moisture removal capability.
- The TDAFWP maintenance procedures were revised to provide instructions for check and adjustment of the assembled linkage.

7.0 SIMILAR EVENTS

LER 50-281/96-04-00, Turbine/Reactor Trip Due to High Level in the Steam Generator

With power escalation in progress for Unit 2, the operators began transferring from manual feedwater flow control to automatic control. At 16% reactor power, a high-high SG 'B' level signal caused a turbine trip and subsequent reactor trip. The root cause of the trip was design interface. Specifically, manual SG level control at low power, combined with other equipment malfunctions, challenged the operating team

to the point where the SG level could not be successfully controlled. A design change was implemented to replace the feed regulating valve on Unit 1 as is noted in the above discussions.

8.0 MANUFACTURER/MODEL NUMBER

The TDAFWP governor that was replaced was a Woodward PG-PL.

9.0 ADDITIONAL INFORMATION

None